

REMARKS

This Amendment, submitted in response to the Office Action dated May 31, 2002, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration is respectfully requested.

Claims 1-12 remain pending in the application. Claims 1 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al. (U.S. Patent No. 5,463,618) in view of Applicant's admitted prior art. Claims 2 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of Applicant's admitted prior art and Schalk et al. (U.S. Patent No. 5,475,791). Claims 3 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of Applicant's admitted prior art, Schalk, and Flores et al. ("Continuous Speech Recognition In Noise Using Spectral Subtraction And HMM Adaptation," 1994). Claims 4-5 and 10-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa, Applicant's admitted prior art, Schalk, Rahim et al. ("Signal Conditioning Techniques for Robust Speech Recognition," 1996), and alleged well known prior art. Claims 6 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rahim and alleged well known prior art.

THE CITED REFERENCES DO NOT DISCLOSE THE STRUCTURE RECITED IN CLAIM 1

MPEP § 2114 provides, "Even if the prior art device performs all the functions recited in the claim, the prior art cannot anticipate the claim if there is any structural difference." Claim 1 is an apparatus claim and claim 7 is a method claim. The Examiner summarily rejected apparatus claim 1 by focusing only on function, without

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consideration of the structural differences between claim 1 and the combination of Furukawa and Applicant's admitted prior art.

Furukawa and Applicant's admitted prior art, singularly or in combination, does not disclose a speech processing apparatus comprising "*control means* for, in a frame for which the result of a decision made by *decision means* is negative, storing in *storage means* the current impulse response held by *supply means* and, in a frame for which the result of a decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means," as recited in claim 1. The Examiner has not particularly pointed out which elements in Furukawa and Applicant's admitted prior art the Examiner contends are (1) control means; (2) decision means; (3) storage means; and (4) supply means, as recited in claim 1. Instead, the Examiner merely asserts:

. . . Furukawa teaches suspending or continuing adaptation so as to control or renew filter coefficients of the adaptive filter, which reads on "...storing in said storage step the current impulse response...retrieving one of the stored impulse responses stored.."

Office Action, page 3. However, the Examiner has not particularly pointed out the *structures* that perform these functions. Even if Furukawa teaches suspending or continuing adaptation, Furukawa and Applicant's admitted prior art, singularly or in combination, does not teach (1) *control means* for, in a frame for which the result of a decision made by *decision means* is negative, storing in *storage means* the current impulse response held by *supply means* and (2) *control means* for, in a frame for which the result of a decision made by *decision means* is positive, retrieving one of the impulse responses stored in said *storage means* and supplying it to said *supply means*.

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Because the Examiner has failed to cite where these elements are disclosed in Furukawa and Applicant's admitted prior art, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness. See, MPEP 2142 ("The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. . . . To establish a prima facie case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations."). If the Examiner continues to maintain that Furukawa and Applicant's admitted prior art discloses control means as recited in claim 1, Applicant respectfully requests the Examiner to particularly point out where (1) control means; (2) decision means; (3) storage means; and (4) supply means are disclosed in the cited references so that Applicant may have the opportunity to reply completely. See, 37 CFR § 1.104 ("When a reference is complex . . . the particular part relied on must be designated as nearly as practicable."); MPEP § 706 ("The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity.").

Similarly, regarding claim 7, Furukawa and Applicant's admitted prior art, singularly or in combination, does not disclose a control step for (1) in a frame for which the result of a decision made by a *decision step* is negative, storing in a *storage step* the current impulse response held by *supply means* and (2) in a frame for which the result of a decision made by *decision step* is positive, retrieving one of the impulse responses stored in said *storage step* and supplying it to said *supply step*. The Examiner contends that Furukawa discloses this element stating, "Furukawa teaches

suspending or continuing adaptation so as to control or renew filter coefficients of the adaptive filter.” However, Furukawa does not disclose (1) storing in a *storage step* the current impulse response held by *supply means*, in a frame for which the result of a decision made by a *decision step* is negative and (2) retrieving one of the impulse responses stored in said *storage step* and supplying it to said *supply step*, in a frame for which the result of a decision made by *decision step* is positive. The Examiner has not particularly pointed out where (1) a storage step; (2) a decision step; and (3) a supply step are disclosed in the cited references. If the Examiner continues to maintain that Furukawa and Applicant’s admitted prior art discloses a control step as recited in claim 7, Applicant respectfully requests the Examiner to particularly point out where (1) a storage step; (2) a decision step; and (3) a supply step are disclosed in the cited references so that Applicant may have the opportunity to reply completely. See, 37 CFR § 1.104; MPEP § 706.

Still further, claim 1 has been amended to include the feature that the microphone input signal comprises background noise. Furukawa does not disclose a microphone input signal having background noise. Furukawa is only concerned with acoustic echoes. See e.g., col. 1, ll. 5-10. Accordingly, Furukawa does not disclose “decision means for checking . . . whether or not a voice is included in the microphone input signal . . . wherein the microphone input signal comprises background noise.” Since the echo-canceller of Furukawa determines whether an input signal is a speech signal based on an input signal level (see e.g., col. 7, ll. 40-55), the echo-canceller of Furukawa can not correctly determine whether a voice is included in a microphone input signal when the microphone input signal comprises background noise. That is, the

echo-canceller Furukawa will falsely determine that a voice is present when only background noise is present.

An exemplary embodiment of the present invention overcomes this problem by providing, for example, "decision means for checking, *in each frame*, whether or not a voice is included in the microphone input signal, by *using time domain information and frequency domain information* of said acoustic echo-canceled signal, wherein the microphone input signal comprises background noise" and by providing "control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by said supply means and, in a frame for which the result of decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means."

Decision means, as recited in claim 1, may correctly determine whether voice is included in a microphone input signal when the microphone input signal comprises background noise by utilizing time domain information and frequency information. Furthermore, when it is determined that a voice is not included in the microphone input signal, an impulse response is stored in storing means. When it is determined that voice is included in the microphone input signal, the impulse response stored in storing means is supplied to supply mean. In this way, the impulse response is not influenced by voice even when the input signal includes voice, background noise, and acoustics. Because the impulse response is not influenced by a voice signal, the voice signal is not mistakenly echo-cancelled. Because Furukawa does not disclose decision means and controls means as recited in claim 1 (because Furukawa is not concerned with

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background noise), the combination of the cited references do not anticipate the claimed invention.

Based on the above, claims 1 and 7 are patentable over the cited references. Claims 2-5 and claims 8-11 are at least patentable based on their dependency from claims 1 and 7, respectively.

THERE IS NO MOTIVATION TO COMBINE FURUKAWA AND APPLICANT'S ADMITTED PRIOR ART

MPEP § 2143.01 states that obviousness can only be established by combining or modifying the teachings of the prior art *where there is some teaching, suggestion, or motivation to do so* found either (1) in the references themselves or (2) in the knowledge generally available to one of ordinary skill in the art. Accordingly, pursuant to MPEP § 2143.01, if neither Furukawa, Applicant's admitted prior art, nor the knowledge generally available to one of ordinary skill in the art teaches modifying the references to produce the claimed invention, then obviousness cannot be established.

The Examiner does not assert that Furukawa, Applicant's admitted prior art, or the knowledge generally available to one of ordinary skill in the art teaches modifying the references to produce the claimed invention. Instead, the Examiner merely asserts:

Furukawa does not specifically disclose using time domain and frequency domain information of the acoustic echo-canceled signal for checking whether or not voice is included in the microphone input signal. However, checking, in each frame, whether or not voice is included in an input signal, by using time domain and frequency domain information of an acoustic echo-canceled signal is known in the art, as indicated by applicant's admitted prior art.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify the system of Furukawa

et al, to implement checking, in each frame, whether or not voice is included in an input signal, by using time domain and frequency domain information, for the purpose of improving signal quality in a mobile communications environment.

Office Action, pages 2-3. The Examiner merely states that Applicant's admitted prior art discloses a missing feature of Furukawa and then concludes that it would have been obvious to modify Furukawa to include the missing feature. However, the Examiner has failed to point out *some teaching, suggestion, or motivation* found in either Furukawa, Applicant's admitted prior art, or the knowledge generally available to one of ordinary skill in the art to modify Furukawa. The Examiner has merely combined the references and stated that it would have been obvious to do so, without pointing to the prior art that suggests the desirability of the combination. See, MPEP § 2143.01 ("The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination."); See also, In re Gorman, 933 F.2d 982, 986-87, 18 U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991)(holding, "It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps."). Further, if the Examiner is relying on the knowledge generally available to one of ordinary skill in the art to modify Furukawa, the Examiner has not provided support for this contention. See, In re Lee, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002) (holding that the factual question of motivation that is material to patentability can not be resolved on subjective belief and unknown authority); In re Zurko, 258 F.3d 1379, 59 U.S.P.Q.2d 1693 (Fed. Cir. 2001) (holding that the USPTO must point to some concrete evidence in the record to support

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core factual findings in a determination of patentability); Memorandum by Stephen G. Kunin, Deputy Commissioner for Patent Examination Policy (February 21, 2002)(stating that it is never appropriate to rely on common knowledge without evidentiary support as sole or principal evidence on which to base rejection); 37 CFR § 1.104 (providing that when a rejection in an application is based on facts within the personal knowledge of an Examiner, the data should be stated as specifically as possible, *and the facts must be supported*, when called for by the applicant, by an affidavit from the Examiner); MPEP § 2144.03 (providing that the Examiner may only take official notice of facts outside of the record which are capable of instant and unquestionable demonstration as being "well-known" in the art and, if the Applicant traverses such an assertion, the Examiner *should cite a reference* in support of his or her position.).

As discussed above, Furukawa is only concerned with acoustic echoes. See e.g., col. 1, ll. 5-10. Since the echo-canceller of Furukawa determines whether an input signal is a speech signal based on an input signal level (see e.g., col. 7, ll. 40-55), the echo-canceller of Furukawa can not correctly determine whether a voice is included in a microphone input signal when the microphone input signal comprises background noise. That is, the echo-canceller Furukawa will falsely determine that a voice is present when only background noise is present. An exemplary embodiment of the present invention overcomes this problem by providing decision means and control means. Because Furukawa is not concerned with background noise there is no motivation to modify Furukawa to produce the claimed invention

Because neither Furukawa, Applicant's admitted prior art, nor the knowledge generally available to one of ordinary skill in the art teaches modifying the references to

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produce the claimed invention, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness. In re Fine, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988)(holding, "The PTO has the burden under section 103 to establish a prima facie case of obviousness - It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.").

Based on the above, claims 1-12 are patentable over the cited references.

FURUKAWA AND APPLICANT'S ADMITTED PRIOR ART TEACH AWAY FROM THEIR ATTEMPTED COMBINATION.

MPEP 2145 states that it is improper to combine references *where the references teach away* from their attempted combination. The Examiner asserts:

Furukawa does not specifically disclose using time domain and frequency domain information of the acoustic echo-canceled signal for checking whether or not voice is included in the microphone input signal. However, checking, in each frame, whether or not voice is included in an input signal, by using time domain and frequency domain information of an acoustic echo-canceled signal is known in the art, as indicated by applicant's admitted prior art.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify the system of Furukawa et al, to implement checking, in each frame, whether or not voice is included in an input signal, by using time domain and frequency domain information, for the purpose of improving signal quality in a mobile communications environment.

Office Action, pages 2-3. However, Furukawa teaches away from "checking, *in each frame*, whether or not a voice is included in the microphone input signal, *by using* time domain information *and frequency domain information*." Furukawa discloses, "It is

assumed that signal processing in the following description is performed all in digital form and that the signal is sampled at a frequency of 8 kHz." Furukawa, col. 5, ll. 54-57; See also, col. 11, ll. 51-53; col. 13, ll. 55-57; and col. 15, ll. 52-54. Based on the teaching in Furukawa that the signal is sampled and processed at a frequency of 8 kHz, Furukawa teaches that the period for judging whether a voice is included in an input signal is approximately 125 nanoseconds. It is well-known to those of ordinary skill in the art that 125 nanoseconds is too short a time period to check whether a voice is included in a microphone input signal using frequency domain information. Accordingly, Furukawa teaches away from using frequency domain information to check whether a voice is included in a microphone input signal.

Furthermore, based on the teaching in Furukawa that the signal is sampled and processed at a frequency of 8 kHz (i.e., 125 nanoseconds), Furukawa teaches away from "checking, *in each frame*, whether or not a voice is included in the microphone input signal." It is well known to those of ordinary skill in the art that 125 nanoseconds is too short to constitute a frame.

Based on the above, Furukawa teaches away from "checking, *in each frame*, whether or not a voice is included in the microphone input signal, *by using* time domain information *and frequency domain information*." Accordingly, it is improper to combine Furukawa and Applicant's admitted prior art. Therefore, claims 1-12 are patentable over the cited references.

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CLAIMS 3 AND 9 ARE PATENTABLE BECAUSE THE CITED REFERENCES DO NOT DISCLOSE EACH AND EVERY ELEMENT OF THE CLAIMS AND THERE IS NO MOTIVATION TO COMBINE THE CITED REFERENCES

MPEP § 2143.03 states that to establish a prima facie case of obviousness of a claimed invention, *all the claim limitations must be taught or suggested by the prior art*. Claims 3 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of Applicant's admitted prior art, Schalk, and Flores. However, the cited references do not disclose "means for determining a spectrum for each frame by performing a Fourier transform *on an acoustic echo-canceled signal*."

The Examiner admits that neither Furukawa, Applicant's admitted prior art, nor Schalk discloses this element. However, the Examiner contends that Flores discloses this element, citing to Fig. 1 of Flores. Applicant submits that Flores does not disclose "means for determining a spectrum for each frame by performing a Fourier transform *on an acoustic echo-canceled signal*." Instead, Flores discloses that "Y is the power spectrum of the current input frame which is either *noisy speech or background noise*." Flores, page 408, column 2. This disclosure does not disclose or suggest performing a Fourier transform on an acoustic echo-canceled signal. Instead this disclosure suggests determining a power spectrum on a signal that has not undergone acoustic echo-cancellation.

Further, the Examiner has combined four (4) references to reject claims 3 and 9. As argued above, the Examiner has the burden of producing some teaching, suggestion, or motivation found either (1) in the references themselves or (2) in the knowledge generally available to one of ordinary skill in the art to combine or modify the references. MPEP § 2143.01. Accordingly, if neither Furukawa, Applicant's admitted

prior art, Schalk, Flores, nor the knowledge generally available to one of ordinary skill in the art teaches modifying the references to produce the claimed invention, then obviousness can not be established. Still further, obviousness requires a reasonable expectation of success. MPEP § 2143.02. Therefore, if neither Furukawa, Applicant's admitted prior art, Schalk, Flores, nor the knowledge generally available to one of ordinary skill in the art teaches a reasonable expectation of success in modifying the references to produce the claimed invention, then obviousness can not be established.

The Examiner contends that Flores teaches "a scheme for robust speech recognition in which a continuous spectral subtraction (CSS) scheme is implemented to enhance a received speech signal." Office Action, page 4. The Examiner then reasons that "it would have been obvious to modify Furukawa, Applicant's admitted prior art, and Schalk to implement a continuous spectral subtraction scheme for a speech recognition system, as taught by Flores, for the purpose of providing signal enhancement of the receives signal." Id.

However, Flores does not teach that a CSS scheme enhances a received speech signal. Instead, Flores teaches that a spectral subtraction schemes causes distortions that adversely affect recognition performance. Flores, page 409, column 1. As a result, Flores discloses a CSS-PMC scheme to compensate for the signal distortion caused by spectral subtraction schemes. Id. More specifically, Flores discloses:

However, most enhancement schemes including spectral subtraction are non-linear processes and *the distortion that they cause will adversely affect recognition performance.*

In previous work, we showed that, given an explicit word boundary detector, it is possible to adapt HMMs within the PMC framework to compensate for *the distortion caused by spectral subtraction*. In this paper, a Continuous Spectral Subtraction (CSS) scheme is described which needs no explicit word boundary detector. In this scheme which is illustrated in Fig. 1, a smoothed estimate of the long term spectrum is continuously calculated and subtracted from the signal. At the same time, the HMMs are compensated using CSS-PMC for *the signal distortion caused by the CSS stage*.

...

At the CSS output an enhanced signal is obtained *but it is distorted*.

Flores, page 409 (emphasis added). Accordingly, Flores does not teach that a CSS scheme enhances a signal, but instead teaches that the CSS scheme distorts signals, which must be corrected by further processing. Therefore, Flores does not teach, suggest, or motivate one of ordinary skill in the art "to modify Furukawa, Applicant's admitted prior art, and Schalk to implement a continuous spectral subtraction scheme for a speech recognition system, as taught by Flores, for the purpose of providing signal enhancement of the receives signal," as the Examiner contends. Furthermore, because Flores discloses that the CSS scheme distorts signals, Flores does not teach a reasonable expectation of success in modifying the references to include a CSS scheme, as required to establish obvious.

Based on the above, claims 3 and 9 are patentable over the cited references for this additional reason.

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THE CITED REFERENCES DO NOT DISCLOSE EACH AND ELEMENT OF CLAIMS 4-6 AND 10-12

MPEP § 2143.03 states that to establish a prima facie case of obviousness of a claimed invention, *all the claim limitations must be taught or suggested by the prior art*. Claims 4-5 and 10-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furukawa, Applicant's admitted prior art, Schalk, Rahim, and alleged well known prior art. Claims 6 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rahim and alleged well known prior art.

Regarding claim 4, the cited references do not disclose (1) means for determining a spectrum for each frame by performing a Fourier transform *on an acoustic echo-canceled signal*, (2) means for successively determining a spectrum mean, (3) means for successively subtracting the spectrum mean from the spectrum, (4) means for determining a cepstrum from the spectrum, (5) means for determining for each talker a cepstrum mean of a speech frame and a cepstrum mean of a non-speech frame, separately, from the cepstrums obtained, and (6) means for subtracting the cepstrum mean of the speech frame of each talker from the cepstrum of the speech frame of the talker and for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker.

Regarding elements (1) through (3) of claim 4, the Examiner does not particularly point out where these features are disclosed in either Furukawa, Applicant's admitted prior art, Schalk, Rahim, or the alleged well known prior art, singularly or in combination. It is noted that the Examiner ***did not*** reject claim 4 in view of Flores. MPEP § 2142 provides, "The examiner bears the initial burden of factually supporting any prima facie

conclusion of obviousness. . . . To establish a prima facie case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations." Because the Examiner has failed to cite where elements (1) through (3) are disclosed in either Furukawa, Applicant's admitted prior art, Schalk, Rahim, or the alleged well known prior art, singularly or in combination, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness.

If the Examiner continues to maintain that elements (1) through (3) are disclosed in the cited references, Applicant respectfully requests the Examiner to particularly point out where these elements are disclosed so that Applicants may have the opportunity to reply completely. If the Examiner's new grounds for rejection include Flores, then Applicant respectfully requests the Examiner to particularly point out the motivation to combine the references found in the cited references or the knowledge generally available to one of ordinary skill in the art. If in the new grounds for rejection the Examiner relies on the knowledge generally available to one of ordinary skill in the art to modify the references, Applicant respectfully requests the Examiner to provide support for this contention. See, In re Lee, 277 F.3d 1338, 61 U.S.P.Q.2d 1430; In re Zurko, 258 F.3d 1379, 59 U.S.P.Q.2d 1693; Memorandum by Stephen G. Kunin, Deputy Commissioner for Patent Examination Policy; 37 CFR § 1.104; MPEP § 2144.03.

Regarding elements (5) and (6), Applicant previously argued that Rahim does not distinguish between speech frames and non-speech frames and therefore does not disclose elements (5) and (6). The Examiner responded that "it is well known in the art to provide for estimates of non speech (or noises) in the implementation of a subtraction scheme for noise suppression." First, this assertion speaks nothing to "means for

determining for each talker a cepstrum mean of a *speech frame* and a cepstrum mean of a *non-speech frame*, separately, from the cepstrums obtained" or "means for subtracting the cepstrum mean of the *speech frame* of each talker from the cepstrum of the *speech frame* of the talker and for subtracting the cepstrum mean of the *non-speech frame* of each talker from the cepstrum of the *non-speech frame* of the talker." More specifically, the Examiner's alleged well-known art speaks to "estimates of non speech (noises)" but does not address "*speech frames*" and "*non-speech frames*." Second, Applicant disagrees with the Examiner's assertion that that "it is well known in the art to provide for estimates of non speech (or noises) in the implementation of a subtraction scheme for noise suppression." Accordingly, Applicant requests the Examiner to cite to a reference to support this contention. See, In re Zurko; Memorandum by Stephen G. Kunin, Deputy Commissioner for Patent Examination Policy; 37 CFR § 1.104; MPEP 2144.03.

Based on the above, claim 4 is patentable over the cited references. Claim 10, a method claim, is patentable for the same reasons. Claims 5, 6, 11, and 12 recite similar elements recited in claims 4 and 10. These claims are patentable over the cited references, for the same reasons.

DUTY TO ANSWER ALL MATERIAL TRAVERSED

Applicants have raised numerous arguments above traversing the Examiner's rejections. The Examiner is respectfully reminded of the duty to answer all material traversed. See, e.g., MPEP § 707.07(f). More specifically, Applicant has presented the following arguments:

(1) Regarding claim 1, Furukawa and Applicant's admitted prior art, singularly or in combination, does not disclose a speech processing apparatus comprising "*control means* for, in a frame for which the result of a decision made by *decision means* is negative, storing in *storage means* the current impulse response held by *supply means* and, in a frame for which the result of a decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means," as recited in claim 1.

(2) Regarding claim 7, Furukawa and Applicant's admitted prior art, singularly or in combination, does not disclose a control step for (1) in a frame for which the result of a decision made by a *decision step* is negative, storing in a *storage step* the current impulse response held by *supply means* and (2) in a frame for which the result of a decision made by *decision step* is positive, retrieving one of the impulse responses stored in said *storage step* and supplying it to said *supply step*.

(3) Because neither Furukawa, Applicant's admitted prior art, nor the knowledge generally available to one of ordinary skill in the art teaches modifying the references to produce the claimed invention, the Examiner has failed to meet the initial burden of establishing a prima facie case of obviousness.

(4) Furukawa teaches away from "checking, *in each frame*, whether or not a voice is included in the microphone input signal, *by using* time domain information *and frequency domain information*."

(5) Regarding claims 3 and 9, the cited references do not disclose "means for determining a spectrum for each frame by performing a Fourier transform *on an acoustic echo-canceled signal*."

(6) Flores does not teach, suggest, or motivate one of ordinary skill in the art "to modify Furukawa, Applicant's admitted prior art, and Schalk to implement a continuous spectral subtraction scheme for a speech recognition system, as taught by Flores, for the purpose of providing signal enhancement of the receives signal," as the Examiner contends. Furthermore, because Flores discloses that the CSS scheme distorts signals, Flores does not teach a reasonable expectation of success in modifying the references to include a CSS scheme, as required to establish obvious.

(7) Regarding claim 4, the cited references do not disclose (1) means for determining a spectrum for each frame by performing a Fourier transform *on an acoustic echo-canceled signal*, (2) means for successively determining a spectrum mean, (3) means for successively subtracting the spectrum mean from the spectrum, (4) means for determining a cepstrum from the spectrum, (5) means for determining for each talker a cepstrum mean of a speech frame and a cepstrum mean of a non-speech frame, separately, from the cepstrums obtained, and (6) means for subtracting the cepstrum mean of the speech frame of each talker from the cepstrum of the speech frame of the talker and for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker.

Applicant respectfully requests the Examiner to address Applicant's arguments regarding these features and particular point out where these features are disclosed in the cited references. See, 37 CFR § 1.104; MPEP § 706.

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CONCLUSION


In view of the foregoing remarks, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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Dated: October 9, 2002

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APPENDIX: VERSION WITH MARKINGS TO SHOW CHANGES

IN THE CLAIMS:

Please amend claim 1 as follows:

1. (Amended) A speech processing apparatus comprising:

generation means for generating a pseudo acoustic echo signal based on a current impulse response simulating an acoustic echo transfer path and on a source signal;

supply means for holding the current impulse response and supplying the current impulse response to said generation means;

elimination means for subtracting said pseudo acoustic echo signal from a microphone input signal to remove an acoustic echo component and thereby generate an acoustic echo-canceled signal;

update means for continually updating the impulse response by using said source signal, said acoustic echo-canceled signal and the current impulse response held by said supply means and for supplying the updated impulse response to said supply means;

decision means for checking, in each frame, whether or not a voice is included in the microphone input signal, by using time domain information and frequency domain information of said acoustic echo-canceled signal, wherein the microphone input signal comprises background noise;

storage means for storing one or more impulse responses; and

control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by said supply means and, in a frame for which the result of decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means.

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